

WHAT IS CLAIMED IS:

1. A gear shaft assembly for actuating linear movement of an object attached thereto, the gear shaft assembly comprising a lower channel assembly, the lower channel assembly comprising:

- (a) a threaded rod;
- (b) a first gear adjacent an end of the threaded rod;
- (c) a second gear engageable with the first gear and attached to the end of the threaded rod;
- (d) a mechanism for driving the first gear against the second gear;
- (e) at least one threaded journal bearing threaded on the correspondingly threaded rod;
- (f) at least one bearing housing supporting the at least one journal bearing;
- (g) a movable carrier arm mounted on the threaded rod and attachable to the object;

wherein, when the mechanism for driving the first gear against the second gear is activated, the first gear drives the second gear, rotating the threaded rod, and moving the carrier arm on the threaded rod.

2. The gear shaft assembly according to Claim 1, further comprising at least one lock nut threaded on the threaded rod for securing the at least one journal bearing in the at least one bearing housing.

3. The gear shaft assembly according to Claim 2, the lower channel assembly further comprising a lower housing, the lower housing comprising:

- (a) a lower housing bottom wall;
- (b) a lower housing front wall oriented generally perpendicularly to the lower housing bottom wall and extending upward from the lower housing bottom wall;

(c) a lower housing rear wall oriented generally perpendicularly to the lower housing bottom wall and extending upward from the lower housing bottom wall; and

(d) a lower housing channel formed by the lower housing bottom wall, the lower housing front wall, and the lower housing rear wall;

wherein the at least one bearing housing is mounted to the lower housing, and the threaded rod extends longitudinally through the lower housing channel.

4. The gear shaft assembly according to Claim 3, wherein the at least one bearing housing is an internal bearing housing and an external bearing housing, the internal bearing housing spanning the lower channel adjacent an end of the lower channel, the external bearing housing being attached to the lower housing at an opposite end of the lower channel.

5. The gear shaft assembly according to Claim 4, wherein the at least one journal bearing is a first journal bearing and a second journal bearing, the first journal bearing being removably insertable in the external bearing housing, and the second journal bearing being removably insertable in the internal bearing housing.

6. The gear shaft assembly according to Claim 5, wherein the at least one lock nut is a first lock nut and a second lock nut, the first lock nut abutting the first journal bearing, and the second lock nut abutting the second journal bearing.

7. The gear shaft assembly according to Claim 3, the lower channel assembly further comprising a plurality of same sized, spaced apart support disks rotatably attached to the lower housing front wall and the lower housing rear wall for guiding the object.

8. The gear shaft assembly according to Claim 3, wherein the first gear and second gear are identical 45 degree mitered gears, and the mechanism for driving the first gear against the second gear is a rotatable drive shaft in the lower channel assembly.

9. The gear shaft assembly according to Claim 8, wherein the first mitered gear is attached to the rotatable drive shaft, the drive shaft extending through the lower housing front wall and the lower housing rear wall and transversely spanning the lower housing channel.

10. The gear shaft assembly according to Claim 3, the lower channel assembly further comprising a movable T-nut threaded on the threaded rod between the second gear and the bearing housing, the T-nut being connected to the carrier arm, the carrier arm extending generally upward from the T-nut.

11. The gear shaft assembly according to Claim 9, the lower channel assembly further comprising a shaft support attached to the lower housing rear wall and the drive shaft extending through the shaft support.

12. The gear shaft assembly according to Claim 1, further comprising an upper channel assembly comprising:

- (a) an upper channel top wall;
- (b) an upper channel front wall oriented generally perpendicular to the upper channel top wall and extending downward from the upper channel top wall;
- (c) an upper channel rear wall oriented generally perpendicularly to the upper channel top wall and extending downward from the upper channel top wall;
- (d) an upper channel formed by the upper channel top wall, the upper channel front wall, and the upper channel rear wall; and
- (e) a mechanism for guiding an upper end of the object.

13. The gear shaft assembly according to Claim 12, wherein the mechanism for guiding an upper end of the object is a plurality of spaced apart rollers rotatably mounted to the upper channel front wall and the upper channel rear wall and transversely spanning the upper channel.

14. The gear shaft assembly according to Claim 13, wherein the object is a hurricane shutter panel.

15. The gear shaft assembly according to Claim 14, wherein the lower housing rear wall and the upper channel rear wall are attached to an exterior wall of a building adjacent a window or door, and the drive shaft extends through the exterior wall into an interior of the building.

16. The gear shaft assembly according to Claim 1, further comprising a slidable attachment system, which comprises at least one L-shaped slidable bar, a corresponding L-shaped window sill bar, and a plurality of slidable attachment rollers; wherein the window sill bar is attachable to a frame of the window, the at least one slidable bar is slidable in a horizontal direction on the window sill bar, and the slidable attachment rollers are set into a horizontally oriented channel between the at least one slidable bar and the window sill bar.

17. The gear shaft assembly according to Claim 16, wherein the lower housing is attached to a side of the at least one slidable bar.

18. The gear shaft assembly according to Claim 12, further comprising an upper channel assembly slidable attachment system, which comprises two matching L-shaped slidable bars, a corresponding L-shaped window sill bar, and a plurality of slidable attachment rollers; wherein the window sill bar is attached to a frame of the window, the

slidable bars are slidable in a horizontal direction on the window sill bar, and the slidable attachment rollers are set into two matching horizontally oriented channels between each of the slidable bars and the window sill bar; and wherein the slidable bars are each attachable to the upper channel assembly.

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19. A tandem gear shaft assembly for actuating simultaneous linear movement of two objects attached thereto, the tandem gear shaft assembly comprising a second lower channel assembly, the second lower channel assembly comprising:

- (a) two same-sized threaded rods oriented in the same direction as one another;
- (b) a first gear between two ends of the two threaded rods;
- (c) two same-sized second gears, each engageable with the first gear and attached to the end of each of the threaded rods;
- (d) a mechanism attached to the first gear for driving the first gear against the second gears;
- (e) at least two same-sized threaded journal bearings, each threaded on one of the correspondingly threaded rods;
- (f) at least two same sized bearing housings, each holding one of the at least two journal bearings; and
- (g) two same sized movable carrier arms, each mounted on one of the threaded rods, each being attached to one of the objects.

20. The tandem gear shaft assembly according to Claim 19, wherein the first gear and second gears are identical 45 degree mitered gears, and the driving mechanism attached to the first gear is a drive shaft, the drive shaft being oriented generally perpendicular to the threaded rods.

21. The tandem gear shaft assembly according to Claim 19, wherein the objects are two complementary shutter panels, each shutter panel being affixed to one of the two movable carrier arms.

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22. A method for installing a gear shaft assembly on a window, the method comprising the steps of:

- (a) cutting a length of threaded rod to correspond to a size of the window;
- (b) setting a journal bearing in an internal bearing housing in a lower channel assembly;
- (c) inserting a first end of the threaded rod into the journal bearing;
- (d) fastening a lock nut at the end of the journal bearing;
- (e) placing a movable, correspondingly threaded carrier arm on the threaded rod;
- (f) attaching a second gear on the end of the threaded rod;
- (g) inserting a drive shaft attached to a first gear in the lower channel assembly along with the threaded rod, so that the first gear meshes with the second gear, the drive shaft being transversely oriented to the threaded rod; and
- (h) mounting the lower channel assembly beneath the window.

23. The method according to Claim 24, further comprising the steps between steps (e) and (f) of:

- (e2) setting a second journal bearing in an external bearing housing;
- (e3) inserting a second end of the threaded rod through the second journal bearing; and
- (e4) fastening a second lock nut on the second end of the threaded rod to hold the second journal bearing.

24. The method according to Claim 22, further comprising the steps of affixing the carrier arm to a lower end of a window shutter panel, and attaching an upper channel assembly to an upper end of the window shutter panel.